

We claim:

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1	1. A method of operably interconnecting an electrooptic (EO) polymer
2	waveguide and a passive polymer waveguide, comprising:
3	providing a tapered electrooptic (EO) polymer waveguide interconnection
4	structure between an EO polymer waveguide and a passive polymer waveguide.

A method of fabricating a waveguide structure, comprising:

- 2 coating a passive polymer lower cladding over a substrate; coating a passive core layer lower portion over the passive polymer lower 3 4 cladding; 5 curing the passive polymer lower cladding and the passive core layer lower 6 portion; coating an electrooptic (EO) polymer layer over the passive core layer lower 7 8 portion; 9 etching the EO polymer layer to produce a tapered EO polymer layer with a 10 tapered region; coating an passive core layer upper portion over the tapered EO polymer layer; 11 etching the tapered EO polymer layer to produce a rib waveguide structure; 12 13 and
 - 3. The method of fabricating a waveguide structure of claim 2, wherein the passive polymer lower cladding and the passive core layer lower portion are cured with ultraviolet (UV) light.

coating a passive polymer upper cladding over the rib waveguide structure.

1 4. The method of fabricating a waveguide structure of claim 2, wherein 2 the passive polymer lower cladding and the passive core layer lower portion are cured 3 in a nitrogen environment.

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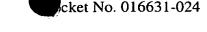
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1	5.	The method of fabricating a waveguide structure of claim 2, wherein
2 ·	the EO polym	er layer is etched by oxygen plasma with a shadow mask to produce the
3	tapered region	ı.

- 1 6. The method of fabricating a waveguide structure of claim 5, wherein a 2 fixed radio frequency (RF) power and gas pressure are employed for etching the EO 3 polymer layer.
- 7. The method of fabricating a waveguide structure of claim 5, wherein a width of a gap between the EO polymer layer and the shadow mask is selected to control a taper length of the tapered region.
- 1 8. The method of fabricating a waveguide structure of claim 2, wherein
 2 the tapered EO polymer layer is etched by:
 3 printing waveguide patterns over the tapered EO polymer layer; and
 4 employing an oxygen reactive ion etching process to produce the rib
 5 waveguide structure.
- 9. A waveguide structure, comprising:
 an electrooptic (EO) polymer waveguide;
 a passive polymer waveguide; and
 a tapered EO polymer waveguide interconnection structure between the EO
 polymer waveguide and the passive polymer waveguide.
 - 10. The waveguide structure of claim 9, wherein the EO polymer waveguide and the passive polymer waveguide provide single mode propagation, and the interconnection structure provides a coupling between the two waveguides without higher order mode coupling.
- 1 11. The waveguide structure of claim 9, wherein an interconnection loss 2 associated with the interconnection structure is less than 0.4 dB.



- The waveguide structure of claim 9, wherein the interconnection 1 12. 2 structure is vertically tapered.
- The waveguide structure of claim 9, wherein a taper length of the 1 13. 2 interconnection structure is 300 µm or more.
- 1 14. The waveguide structure of claim 9, wherein a taper angle of the interconnection structure is no greater than 0.4 degrees. 2
- The waveguide structure of claim 9, wherein the EO polymer 15. 1 waveguide and the passive polymer waveguide are formed as rib structures. 2
- The waveguide structure of claim 9, wherein the EO polymer 16. 1 2 waveguide has a higher refractive index that the passive polymer waveguide.
- The waveguide structure of claim 9, wherein the passive polymer 17. 1 2 waveguide has a larger mode profile than the EO polymer waveguide.
- The waveguide structure of claim 9, wherein the EO polymer 18. 1 2 waveguide comprises a nonlinear chromophore.
- The waveguide structure of claim 18, wherein the nonlinear 19. 1 chromophore includes a tricyanobutadiene acceptor and a phenyltetraene bridge. 2
- The waveguide structure of claim 9, wherein the passive polymer 20. 1 2 waveguide comprises a fluorinated polymer.
- 1 21. The waveguide structure of claim 9, wherein the passive polymer 2 waveguide comprises a fluorinated acrylate.